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Solar architecture as an ethical trend in architectural design practice

Values and ideals of human behaviour and attitudes evolve along with the world; they depend upon historical, political and social conditions as well as on the time in which they function. By introducing ecological awareness into the ethical values determining man's actions, the attitude towards the concept of morality changes as it no longer refers only to people, but also to the environment in which they live. Ecological awareness proper is not integrally connected with changes of human behaviours. The contemporary man's set of moral norms ought to be extended by ecological culture. This culture is closely linked with pro-ecological upbringing, education and natural resources management [3, p. 26].

Excessive environment pollution and a limited amount of mineable resources led to the necessity of changing the expansive attitude of man towards the environment and brought about an interest in alternative energy sources. Popularisation of renewable energy sources is significantly influenced by pro-ecological policy of the European Union. Within the framework of ecological requirements, Poland has also been obliged to undertake activities aimed at sustainable development.

It is commonly agreed that economical values should not be created at the cost of degradation and irreversible changes to the natural environment. This opinion, however, ought to be supported by some specific actions popularizing the idea of sustainable development which are aimed at creating favourable conditions for making decisions as to the use of renewable energy.

Such conditions must be secured by the state by means of a pro-ecological policy whereas the persons who are professionally involved in the building industry ought to broaden their knowledge in order to be able to promote ecological solutions and facilitate their application in buildings by investors. The building industry is one of the most energy-consuming fields of human activity, therefore, the people who are professionally involved in it carry a special burden of responsibility as each decision with regard to the design process has profound consequences for the natural environment.

The problem of excessive energy consumption in the building industry could be resolved by solar architecture. Introduction of solar systems into buildings reduces the demand for energy derived from mineable resources, limits the emissions of greenhouse gases into the atmosphere and it also contributes to the reduction of wastes production. Employment of the solutions which use solar energy seems to be even more advisable if we take into account that it is prevalent, inexhaustible and clean.

Solar heat power engineering is one of the sectors of renewable power engineering which is developing very rapidly worldwide. It is estimated that since 1990 in the course of ten years' time the global use of solar radiation energy almost doubled [4].

Solar radiation can be used in the building industry in a passive or active way. Active usage of solar radiation energy takes place as a result of photo-thermal conversion (thermal energy production) by solar collectors and photo-electrical conversion (electric energy production) by photo-voltaic cell [2]. However, photo-voltaic systems are not so popular yet as solar collectors, mainly due to higher investment costs.

Solar collectors have been more and more popular with people. In 2008 the total area of these systems in Poland was 365 000 m². With this result, Poland came in seventh on the solar energy market among the European Union countries. The Institute of Renewable Energy forecasts that until 2020 it is possible to install in Poland about 20 000 000 m² of solar collector areas in active systems, including over 70% in residential buildings [5, p. 6].

For investors, when making a decision about applying the system, the economical aspect is of key significance. It means the lowest investment expenditures possible and the shortest time of return of incurred costs.

Active solar systems are commonly associated with solar architecture, however, a characteristic feature of the structures of this type is the fact of using solar energy in a passive way. Lack of knowledge about passive solar systems leads to the conviction that solar energy usage entails the growth of investment costs and it is usually associated with sophisticated and uncertain new technologies.

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In reality, however, passive solar systems operation is based on a greenhouse effect which has been known for centuries and these systems use natural solutions, which are simple in construction as well as durable and easy to operate. As a rule, they do not require the usage of complicated technological components or special regular maintenance; they also do not generate any additional operating costs. The simplest versions are not connected with an increase of investment costs either. In most cases, in order to function efficiently, it is not necessary to install any specialist equipment on the building where the passive solar system is to operate. Some of the passive systems function only thanks to appropriate architectural or constructional solutions which are known and used in the traditional building industry and due to their adaptation to the local and climatic conditions. An advantage of passive solar systems is also their diversity thanks to which a solution that is optimal to the investor's expectations can be selected. In the Polish climate, even the most basic passive systems of direct profits, which are not connected with any additional costs, technologies and difficulties in usage, provide measurable thermal gains in the house energy balance and thus turn out to be useful. The current state of knowledge and technologies make it possible to achieve much greater efficiency and profitability of the passive systems which at the same time constitute simple, natural and inexpensive solutions.

At present, western European countries are leaders in solar energy use in architecture; in these countries many solar buildings are erected and individual investors are offered a wide range of proposals in the scope of technological, constructional, material and price possibilities. Ecological awareness of the society is much higher there – this is exemplified by thousands of structures realised in the technology called 'passivhaus' which belong to the group of solar buildings.

In Poland, a passive house is still a novelty and there are only few ready certified realisations of this type. Investors

are rarely aware of possibilities, consequences and first of all benefits that shall be obtained in the case of using solar energy in a building. In order to make a conscious decision about the application of solar systems, an investor ought to be thoroughly informed about this issue by the persons professionally involved in the building industry who are specialists in this domain. Unfortunately, it is not always possible because quite often architects themselves do not have sufficient knowledge of this topic and at the same time they do not have any arguments for solar systems to be used.

Realisation of a solar building is connected with the necessity to carry out analyses of climatic conditions, insolation and shading, which often discourages investors and developers who intend to shorten the time and minimise the costs of the investment. With the low ecological awareness of professionals, investors and the whole society, the idea of a solar building is defeated by the pressure to shorten the investment process and the developers' desire to obtain fast profits.

Popularisation of solar systems and possibilities of their usage in the building industry ought to originate from designers and professionals. The examples of structures which are realised with the use of these solutions shall facilitate the process of their popularisation and implementation, while the investor who is aware of the benefits connected with these solutions shall become a demanding partner in the investment process.

In conclusion, the present situation imposes on architects the requirement to lay out new directions of activities in the process of forming the space of human life. We need to remember that these directions have to include a responsible, pro-ecological design process with respecting the environment and its resources. The architectural practice that is solely aimed at economical values insults the moral code of the contemporary man.

Translated by B. Setkiewicz

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Architektura słoneczna jako nurt etyczny w praktyce architektonicznej

Nadmierne zanieczyszczenie środowiska i ograniczona ilość zasobów kopalnych wywołała konieczność zmiany ekspansywnego stosunku człowieka do środowiska naturalnego oraz zainteresowanie alternatywnymi źródłami energii. Do najbardziej energochłonnych typów działalności człowieka należy budownictwo. Przy niskiej świadomości ekologicznej osób związanych z budownictwem zawodowo, inwestorów, jak i całego społeczeństwa, idea budynku energooszczędnego przegrywa z presją skrócenia czasu procesu inwestycji i dążeniem do osiągnięcia szybkiego zysku. Architektura słoneczna stanowi odpowiedź

na problem konsumpcji energii w budownictwie oraz wpisuje się w ramy coraz bardziej popularnej idei zrównoważonego rozwoju.

Każda decyzja projektowa niesie za sobą konsekwencje dla środowiska naturalnego. Dlatego obecna sytuacja wymaga od architektów wytyczenia kierunków działań w procesie kształtowania przestrzeni życia człowieka, od skali miasta do pojedynczego budynku. Te kierunki powinny uwzględniać dążenie Polski do europejskich standardów w dziedzinie pozyskiwania energii odnawialnej i energooszczędności w budownictwie.

Key words: eco-consciousness, ethical design, solar architecture

Słowa kluczowe: świadomość ekologiczna, etyczne projektowanie, architektura słoneczna